

CMPS 312



Navigation

Dr. Abdelkarim Erradi
CSE@QU

Navigation

The act of **moving between screens** of an app to **complete tasks**

Designing effective navigation =
Simplify the user journey

Outline

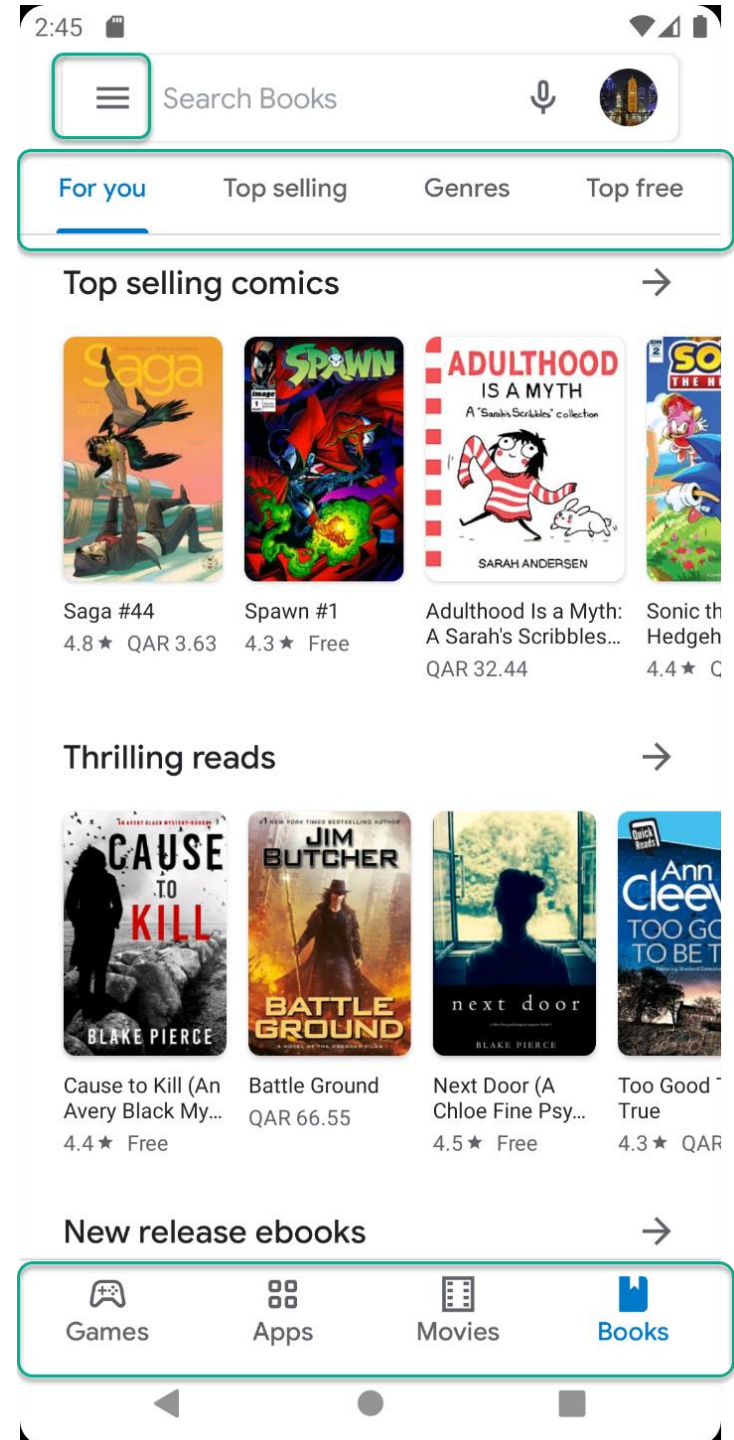
1. Navigation UI
2. Jetpack Compose Navigation
3. Alert Dialog

Navigation UI:

App Bars

Floating Action Button

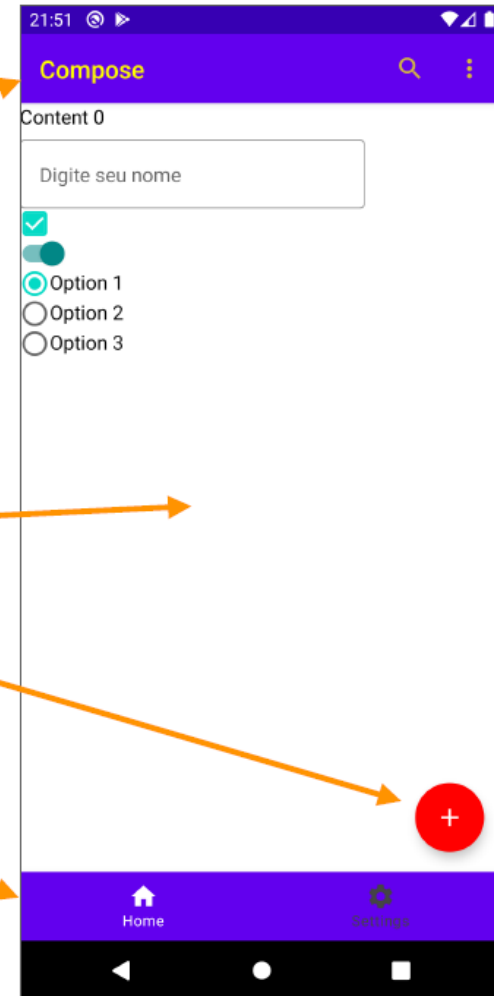
Navigation Drawer



Scaffold

- **Scaffold** is a **Slot-based** layout
- Scaffold is template to build the entire screen by adding different UI Navigation components (e.g., *topBar*, *bottomBar*, *floatingActionButton*)

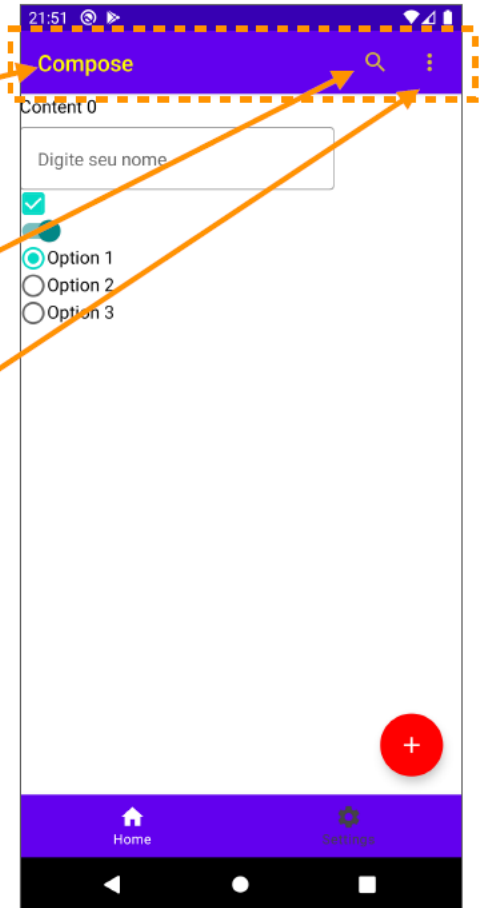
```
Scaffold(  
  topBar = {...},  
  floatingActionButton = {...},  
  bottomBar = {...}  
) {...}
```



AppBar

- Info and actions **related to the current screen**
- Typically has Title, Menu items, Drawer button / Back button

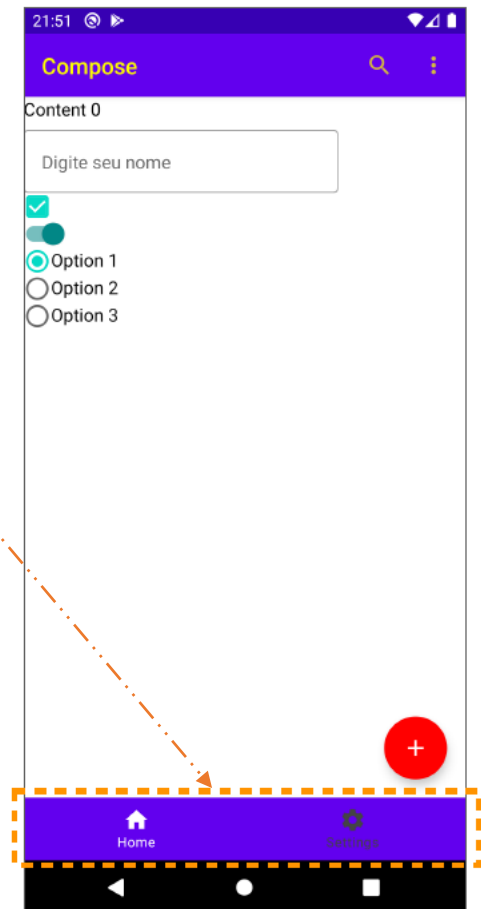
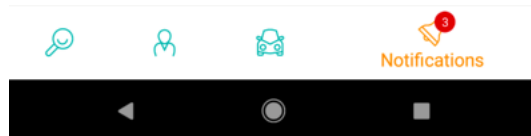
```
AppBar(  
  title = { Text(text = "Compose") },  
  backgroundColor = MaterialTheme.colors.primary,  
  contentColor = Color.Yellow,  
  actions = {  
    IconButton(onClick = {}) {  
      Icon(Icons.Default.Search, "Search")  
    }  
    IconButton(  
      onClick = { ... }  
    ) {  
      Icon(Icons.Filled.MoreVert, "More")  
      DropdownMenu(...)  
    }  
  }  
)
```



BottomAppBar

- Allow movement between the app's primary **top-level destinations** (3 to 5 options)
- Each destination is represented by an icon and an optional text label. May have notification badges

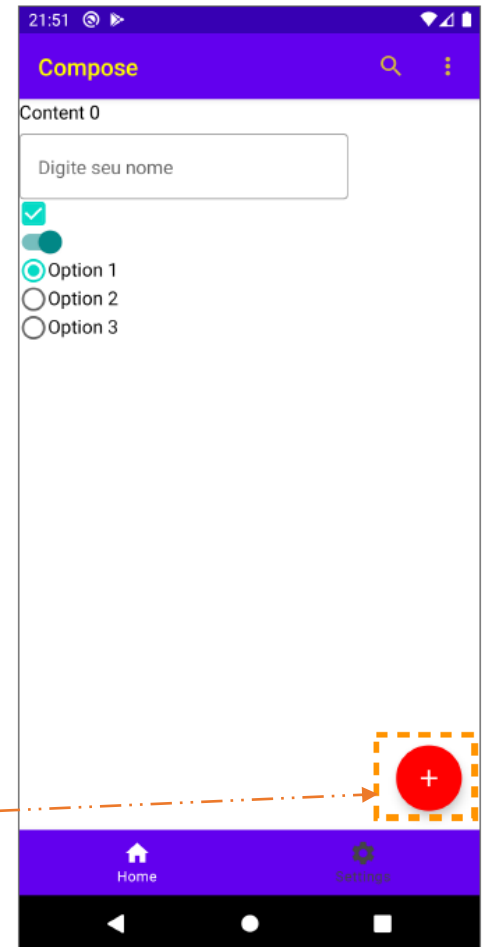
```
BottomAppBar(  
  backgroundColor = MaterialTheme.colors.primary,  
  content = {  
    BottomNavigationItem(  
      icon = { Icon(Icons.Filled.Home) },  
      selected = selectedTab == 0,  
      onClick = { selectedTab = 0 },  
      selectedContentColor = Color.White,  
      unselectedContentColor = Color.DarkGray,  
      label = { Text(text = "Home") }  
    )  
    BottomNavigationItem(...)  
  }  
)
```




Floating Action Button (FAB)

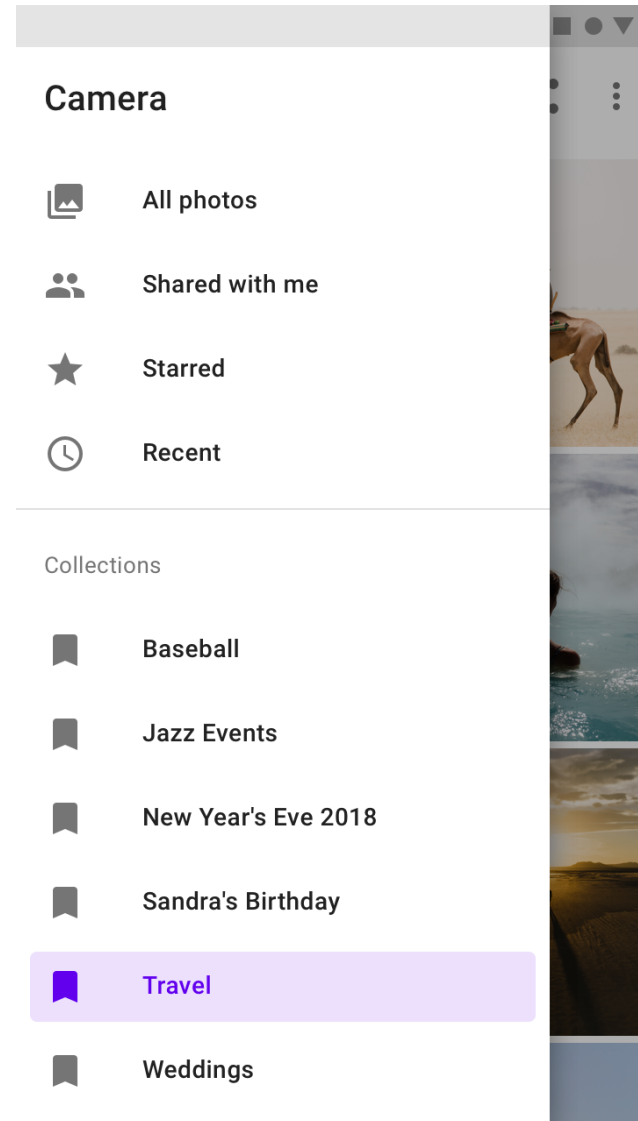
- A FAB performs the primary, or most common, action on a screen, such as drafting a new email
 - It appears in front of all screen content, typically as a circular shape with an icon in its center.
 - FAB is typically placed at the bottom right

```
FloatingActionButton(  
  onClick = { ... },  
  backgroundColor = Color.Red,  
  contentColor = Color.White  
) {  
  Icon(Icons.Filled.Add, "Add")  
}
```



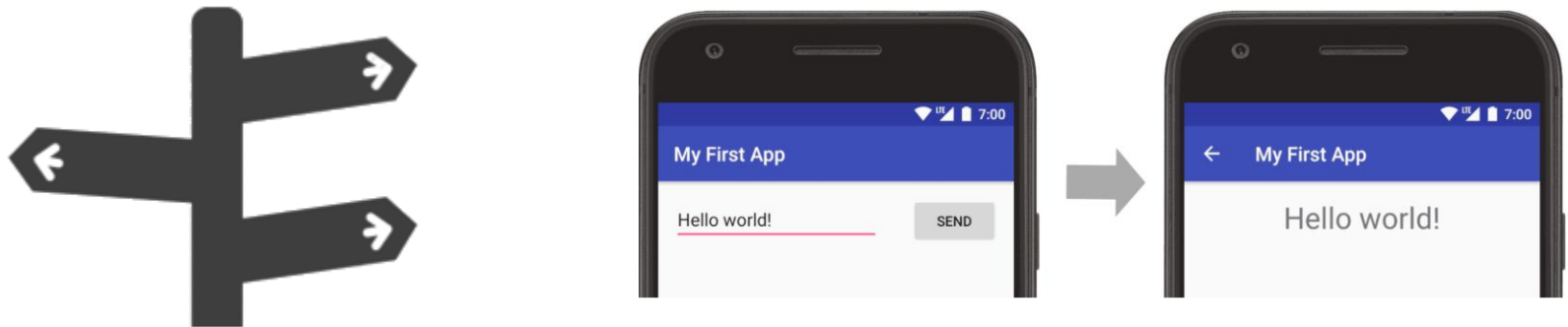
Navigation Drawer

- Navigation Drawer provides access to **primary destinations**, such as switching accounts
 - Recommended for five or more top-level destinations
 - Quick navigation between unrelated destinations
- The drawer appears when the user touches the drawer icon  in the app bar or when the user swipes a finger from the left edge of the screen



Jetpack Compose Navigation

A framework for navigating between destinations within an app



Single Activity with Multi-Screens

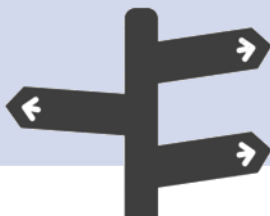
- App UI = { 1 Activity + Multi-Screens }
 - A Screen is a composable that represents **a portion of the UI**
- The Navigation Component enables implementing Single Activity App with the ability to navigate between the app screens (i.e., composables)
- Requires the following dependency in app module's *build.gradle* file:

```
implementation "androidx.navigation:navigation-compose:2.4.0-alpha09"
```

Key Components

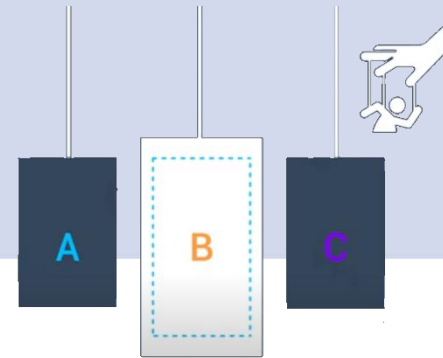
NavHost

- Defines the app **Navigation Graph** = possible **routes** a user can take through the app
- Profile a container where screens will be displayed as the user navigate through the app



NavController

- Manages the transition and **loading** of destination screens into the NavHost as the user navigates through the app
- Keeps track of the **back stack** of visited screens



Creating a NavHost

- The **NavHost** (typically added to the Main Screen) is used to define a **navigation graph** that specifies the possible **routes** within the app & the start destination route
 - Route is a String that defines the **path** that leads to a specific destination (i.e., a screen implemented as composable)
 - Each app destination should have a unique route
- The Nav Graph is defined using the **composable()** function to map each **route** to the associated **screen**

```
NavHost(navController = navController, startDestination = "profile") {  
    composable("profile") { Profile(/*...*/) }  
    composable("friendslist") { FriendsList(/*...*/) }  
    /*...*/  
}
```

Navigate to a destination using NavController

- The **NavController** is created (typically in the Main Screen) using the **rememberNavController()**

`val navController = rememberNavController()`
- Then use the **navigate(*destinationRoute*)** method to navigate to a specific destination
 - The requested destination screen will be loaded in the **NavHost**

```
@Composable
fun Profile(navController: NavController) {
    /*...*/
    Button(onClick = { navController.navigate("friends") }) {
        Text(text = "Navigate next")
    }
}
```

Navigate with arguments

- To pass arguments to a destination e.g., get the profile for user 123 `navController.navigate("profile/1234")`
 - First add the argument placeholder to the destination route e.g., The user profile destination takes a *userId* argument to determine which user to display

```
NavHost( ...) {  
    composable("profile/{userId}") {...}  
}
```

- By default, all arguments are parsed as strings. You can specify another type by using the arguments parameter

```
composable("profile/{userId}",  
    arguments = listOf(navArgument("userId") { type = NavType.IntType })  
) { ... }
```

Extract the Nav Arguments from the Nav BackStackEntry

- NavBackStackEntry represent of an entry in the back stack
 - The router provides access the current **BackStackEntry** to retrieve the route arguments from it

```
composable("profile/{userId}",  
    arguments = listOf(navArgument("userId") { type = NavType.IntType })  
) { backStackEntry ->  
    // Extract the Nav Arguments from the Nav BackStackEntry  
    Profile(navController, backStackEntry.arguments?.getInt("userId"))  
}
```


Adding optional arguments

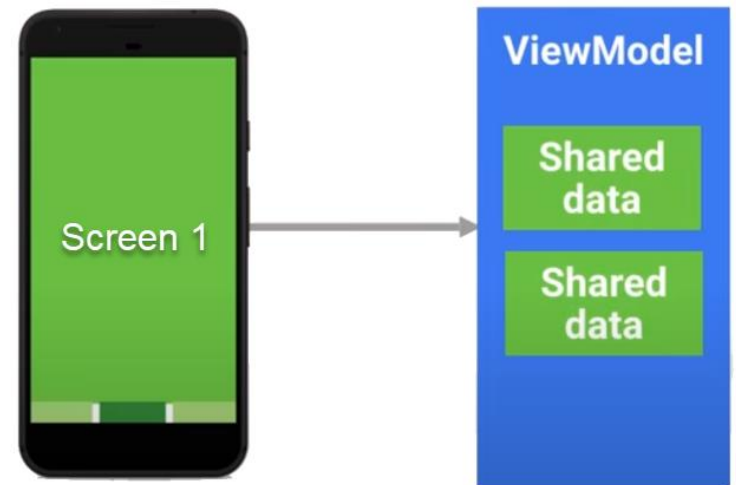
- Optional arguments must be explicitly added to the `composable()` as a query parameter **?argName={argName}**
 - They must have a `defaultValue` set, or have `nullability = true` (which implicitly sets the default value to null)

```
composable("profile?userId={userId}",
    arguments = listOf(navArgument("userId") { defaultValue = "me" })
) { backStackEntry ->
    Profile(navController, backStackEntry.arguments?.getString("userId"))
}
```

Shared data between Screens using ViewModel



- Screens can **share** data a using **ViewModel** class (i.e., a class that extends `ViewModel()`)



`@Composable`

```
fun ProfileScreen(userId: Int = 0) {  
    // Get the profile details from the viewModel  
    val profileViewModel : ProfileViewModel = viewModel()  
    val profile = profileViewModel?.getUser(userId)  
    ... }  
}
```



NavOptions - popUpTo and popUpTo inclusive

- By default, `navigate()` adds the new destination to the back stack. To modify this behavior, pass **navigation options** to `navigate()` call
 - `popUpTo(route)` pop off previously visited destinations from the back stack (up to the specified route)
 - For example, after a login flow, you should **pop off all the login-related destinations** of the back stack so that the Back button doesn't take users back into the login flow
 - It should go back to the Home Screen while removing all visited destinations from the back stack
 - If **inclusive** = `true` the destination specified in `popUpTo` should also be removed from the back stack

Navigation Options: popUpTo & launchSingleTop

*// Pop everything up to the "home" destination off the back stack before
// navigating to the "friends" destination*

```
navController.navigate("friends") {  
    popUpTo("home")  
}
```

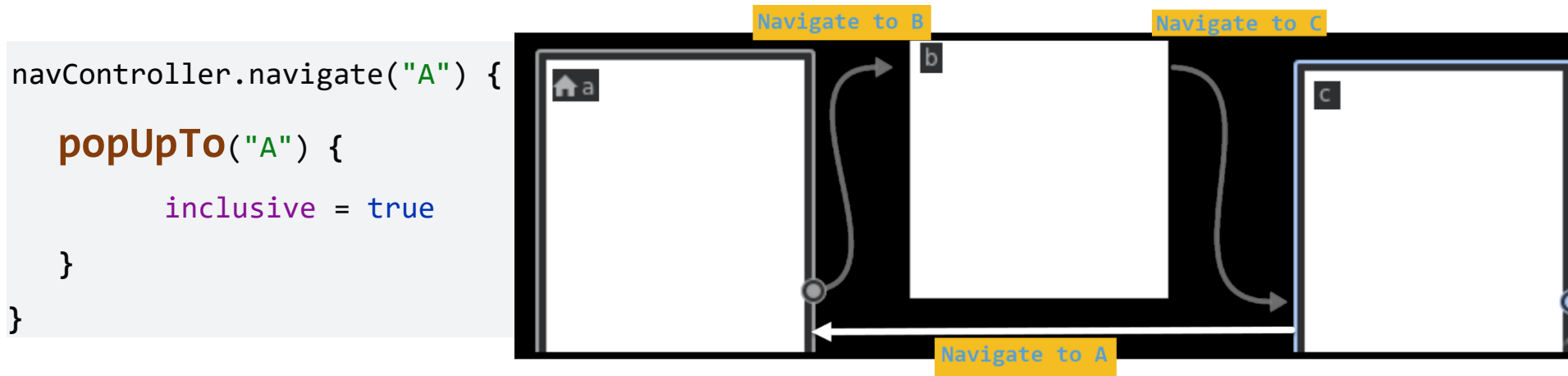
*// Pop everything up to and including the "home" destination off
// the back stack before navigating to the "friends" destination*

```
navController.navigate("friends") {  
    popUpTo("home") { inclusive = true }  
}
```

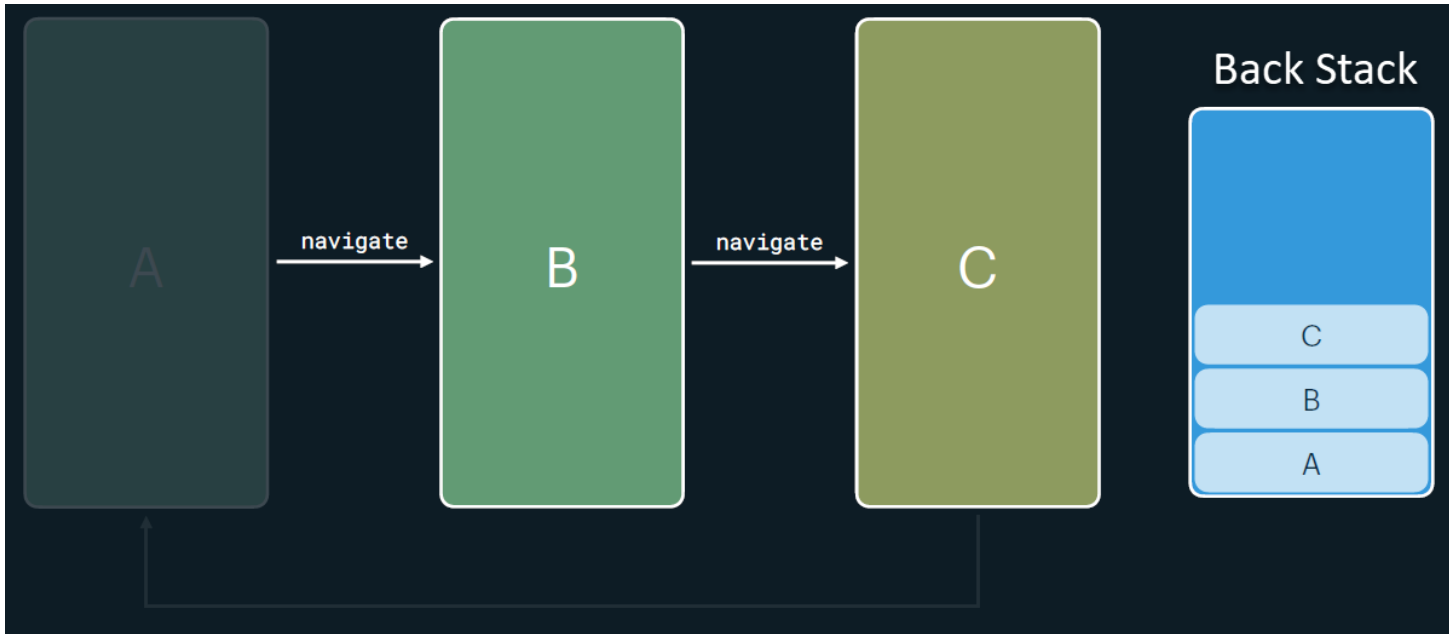
*// Navigate to the "search" destination only if we're not already on
// the "search" destination, avoiding multiple copies on the top of the
// back stack*

```
navController.navigate("search") {  
    launchSingleTop = true  
}
```

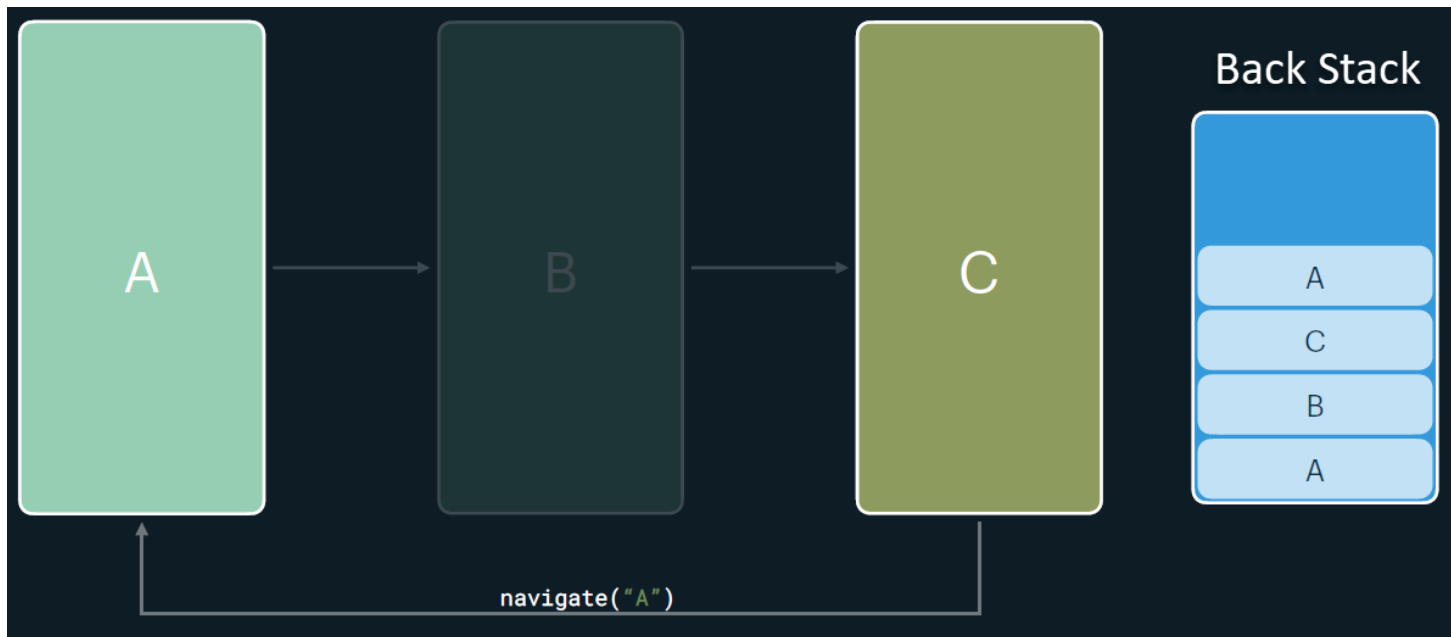
popUpTo Example

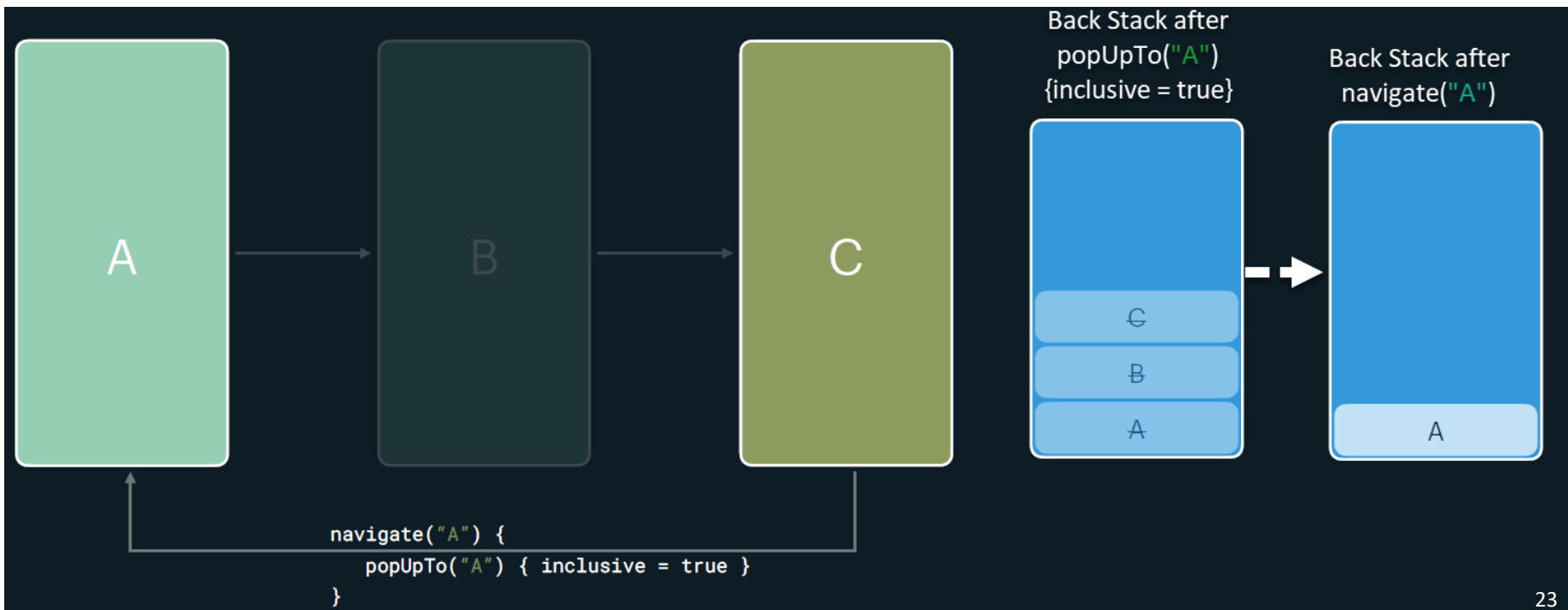
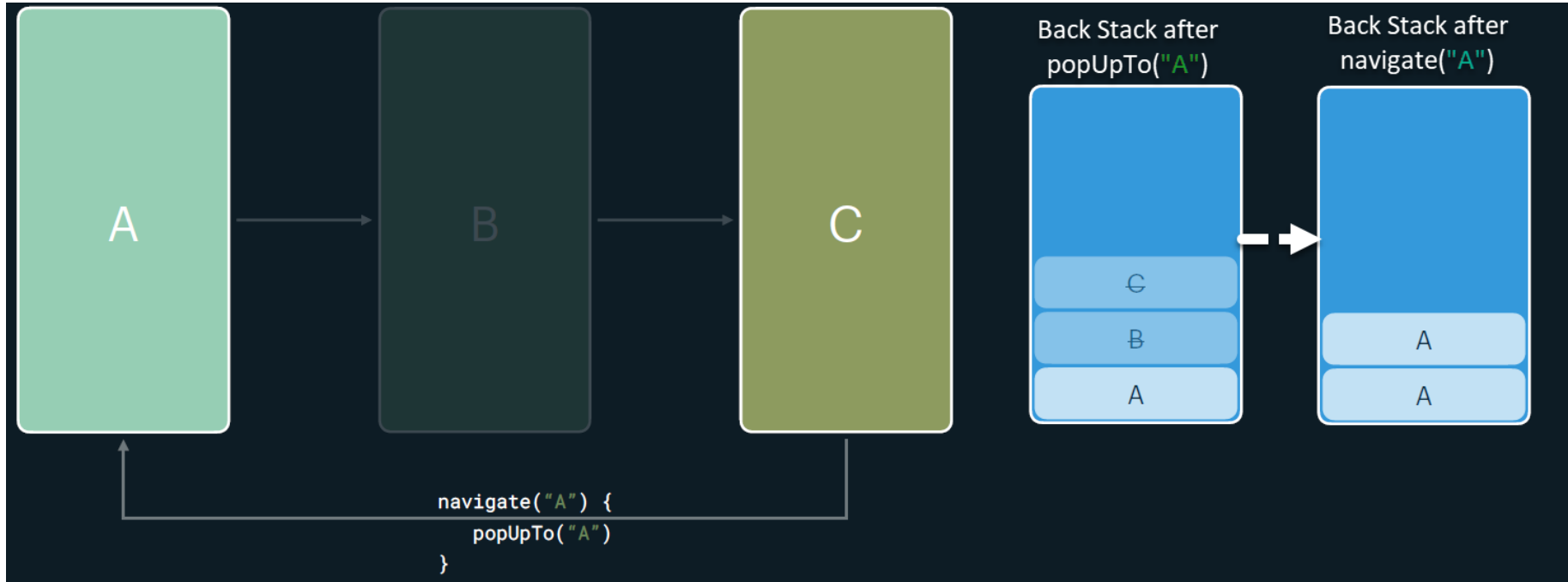


- After reaching C, the back stack contains (A, B, C). When navigating back to A, we also **popUpTo A**, which means that we remove B and C from the stack as part of the call to **navigate("A")**
 - With `inclusive= true`, we also pop off that first A of the stack to avoid having two instances of A



`navController.navigate("A")`





Alert Dialog



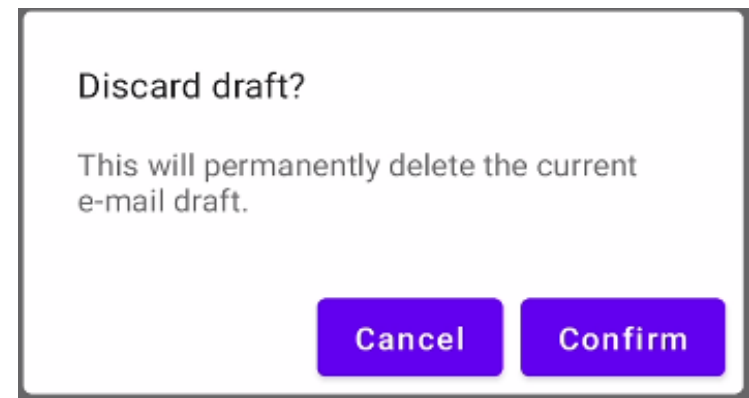
Alert Dialog

- Alert dialog is a Dialog which interrupts the user with urgent information, details or actions
- Dialogs are displayed in front of app content
 - Inform users about a task that may contain **critical information** and/or **require a decision**
 - Interrupt the current flow and remain on screen until dismissed or action taken. Hence, they should be used sparingly
- 3 Common Usage:
 - **Alert dialog:** request user action/confirmation. Has a title, optional supporting text and action buttons
 - **Simple dialog:** Used to present the user with a list of actions that, when tapped, take immediate effect.
 - **Confirmation dialog:** Used to present a list of single- or multi-select choices to a user. Action buttons serve to confirm the choice(s)

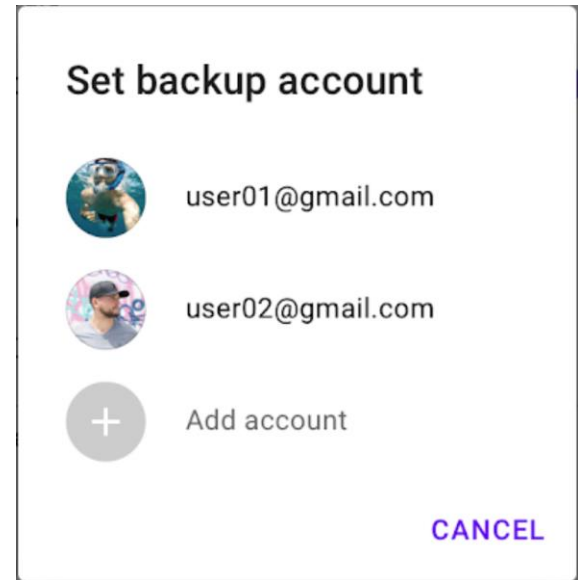
Alert Dialog

AlertDialog(

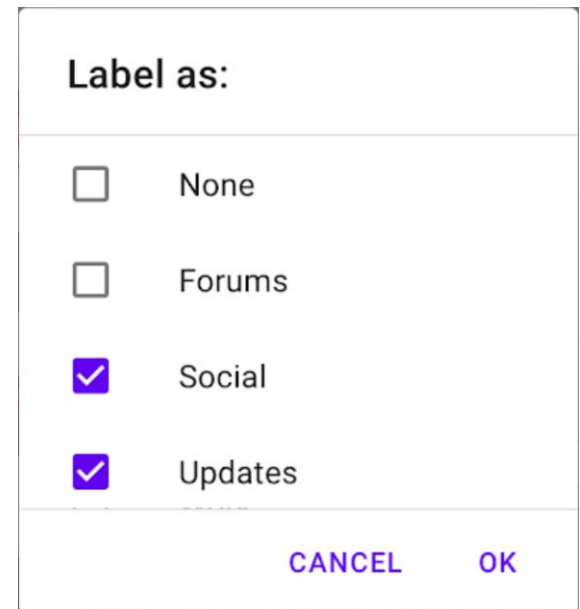
```
onDismissRequest = {  
    // Dismiss the dialog when the user clicks outside the dialog  
    // or on the back button  
    onDialogOpenChange(false)  
},  
title = { Text(text = title) },  
text = { Text(text = message) },  
confirmButton = {  
    Button(  
        onClick = { onDialogResult(true) }) {  
            Text(text = "Confirm")  
        }  
    },  
dismissButton = {  
    Button(  
        onClick = { onDialogResult(true) }) {  
            Text("Cancel")  
        }  
    }  
}  
)  
}
```



Simple dialog



Confirmation dialog (multi choice)



Routing to External App

- **Intent** can be used to route a request to another app
 - Specify an **Action** and the **Parameters** expected by the action
 - Implicit intents can be handled by **a component in the system** registered to handle that intent type

- **Dial a number:**

```
val intent = Intent(Intent.ACTION_DIAL).apply {  
    data = Uri.parse("tel:$phoneNumber")  
} context.startActivity(intent)
```
- **Open a Uri**

```
val intent = Intent(Intent.ACTION_VIEW,  
    Uri.parse("https://www.qu.edu.qa"))  
startActivity(intent)
```
- **Share content**

```
val intent = Intent(Intent.ACTION_SEND).apply {  
    putExtra(Intent.EXTRA_TEXT, content)  
    type = "text/plain"  
}  
context.startActivity(Intent.createChooser(intent, "Share via"))
```
- Other common intents discussed [here](#)

Resources

- Jetpack Compose Navigation
 - <https://developer.android.com/jetpack/compose/navigation>
- Jetpack Compose Navigation codelab
 - <https://developer.android.com/codelabs/jetpack-compose-navigation>